

## TA201C DATA MODEM SELF-DIAGNOSTICS

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1.02 This section is being reissued to reflect the following new information:

- Corrections to lamp indications in Table 3-A, Fig. 3-2, and 3-3.
- Deletion of DTR from paragraphs 4.03 and 5.02.

### B. Pretest Checks

1.03 Before performing any tests, check that the following requirements are met:

- Data modem option straps are correctly selected for the service application.
- Data modem is correctly connected.
- Power is applied to data modem.

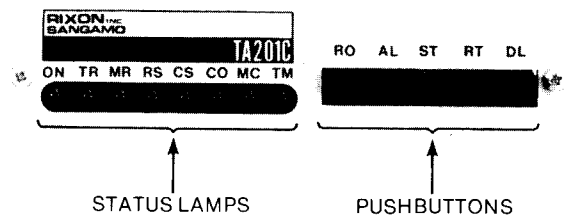
### C. Data Modem Pushbuttons

1.04 The self-diagnostics employs five pushbuttons and eight lamps on the data modem (Fig. 3-1) to check circuit performance. Table 3-A shows the switch positions and lamp status during test. Once pressed, the switch should remain in until pressed a second time to return it to the out position.

## 1. GENERAL

### A. Introduction

1.01 This section provides the procedures required to test the RIXON® TA201C series data modems employing self-testing methods (without external test equipment). These tests should be performed before reporting a data modem malfunction.



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**Fig. 3-1. Data Modem Lamps and Pushbuttons**

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**TABLE 3-A**  
**SWITCH POSITIONS AND STATUS LAMPS**

SWITCH OR LAMP	LOCAL SELF-TEST			ANALOG LOOP-BACK TEST	TWO-WIRE END-TO-END SELF-TEST		FOUR-WIRE END-TO-END SELF-TEST		FOUR-WIRE DIGITAL LOOPBACK TEST	
					XMIT END	RECV END	LOCAL END	REMOTE END	LOCAL END	REMOTE END
RO switch		X				X				
AL switch	X	X	X	X						
ST switch	X	X	X		X	X	X	X	X	
DL switch			X							X
ON lamp	On	On	On	On	On	On	On	On	On	On
TR lamp	On	On	On	*	On	On	On	On	On	*
MR lamp	On	‡‡	On	‡‡	On	On	On	On	On	Off
RS lamp	On	Off	On	‡	On	Off	On	On	On	On
CS lamp	On	Off	On	†	On	Off	On	On	On	
CO lamp	On	Off	On	§	Off	On	On	On	On	On
MC lamp	**	On	††	¶	On	**	**	**	**	Off
TM lamp	On	On	On	On	On	On	On	On	On	On

**NOTES:**

X—switch pressed.

(Blank)—switch not pressed.

\* Under control of customer interface.

† On when data is being transmitted.

‡ On for about 2 sec after CO lamp goes out.

§ On when line signal is being received.

¶ On when CO lamp is not lighted; off when CO lamp is lighted.

\*\* Off except when errors occur.

†† Alternately flashes on and off at a rate of approximately .75 Hz.

‡‡ On or Off depending on status of YM/YN option.

### 1.05 Labeling and functioning of the pushbutton switches are as follows:

- **RO — (Receive Only)** Internally places the Request To Send signal in the OFF condition, regardless of the ON/OFF condition of the Request To Send signal from customer interface or other test pushbuttons. This pushbutton conditions the data modem as a receiver and is used when testing over two-wire facilities.
- **AL — (Analog Loopback)** Connects an attenuated output of the local transmitter to local receiver input. In four-wire operation both transmit and receive lines are terminated in 600 ohms, or the receive line is looped back through a 16 dB amplifier to the transmit line. When in the AL test mode on a two-wire switched network, the data modem does not automatically answer incoming calls and cannot be manually placed in data mode. The talk feature is not inhibited and calls can be made with the telephone. However, attempting to transfer to data mode disconnects the line.
- **ST — (Self-Test)** Conditions data modem transmitter to operate with a built-in word generator and the receiver to operate with a built-in word comparator. Customer interface data signals are disconnected from the data modem transmitter and receiver. Request To Send and Data Terminal Ready control signals are internally placed in the ON condition.
- **RT — (Remote Test)** Conditions data modem for testing from a remote data test center over the two-wire switched DDD network.
- **DL — (Digital Loopback)** Connects received digital data output to the transmitter input, received clock signal to the external transmit clock input, and Carrier On signal output to the Request To Send input. Digital Loopback is normally used in four-wire applications. In this test mode, the data modem can also be used as a regenerator.

(Disturb Loop) When pushbutton is pressed along with Analog Loopback or Self-Test pushbutton, the data modem receiver is

forced to lose bit synchronization. As a result, errors are generated in the demodulated data stream causing data modem MC lamp to flash at a rate of about once per second. The data modem is therefore tested for error recognition and receiver resynchronization in either two- or four-wire applications.

### D. System Checkout

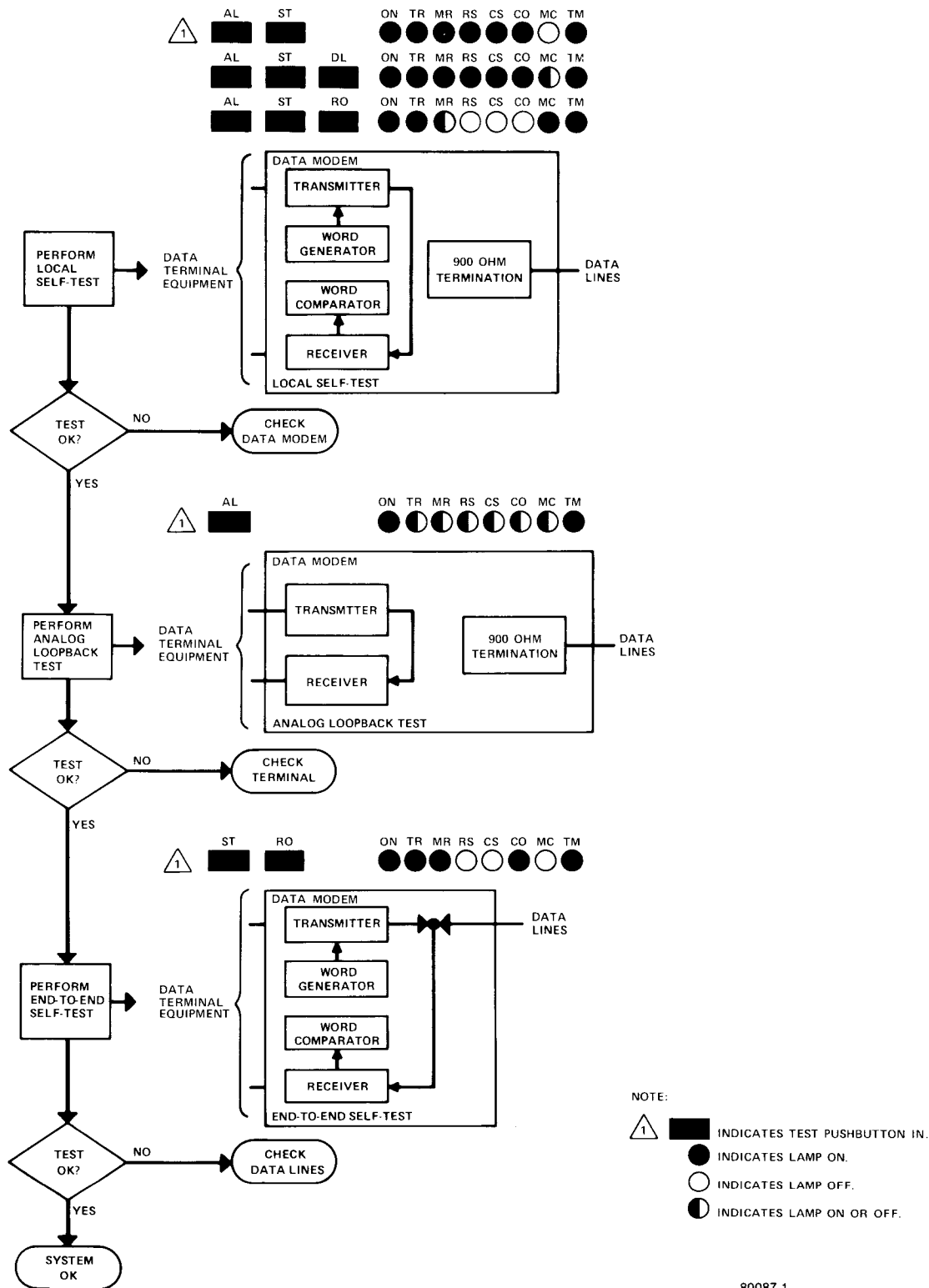
**1.06** Figures 3-2 and 3-3 provide system checkout diagrams for two- and four-wire systems. If a data system malfunction is suspected, always perform the tests before calling for assistance (see paragraph 1.03 in the 200 section of this manual).

### 2. LOCAL SELF-TEST (TWO- OR FOUR-WIRE)

**2.01** Refer to Figs. 3-2 and 3-3 for a block diagram of the data modem during local self-test. During this test, the transmitter line signal output is internally connected to the receive line signal input. The received signal is monitored by the data modem MC lamp. When the local self-test is performed, both Analog Loopback (AL) and Self-Test (ST) pushbuttons are pressed. The Digital Loopback (DL) pushbutton is also pressed to check if data modem can recognize a failure condition.

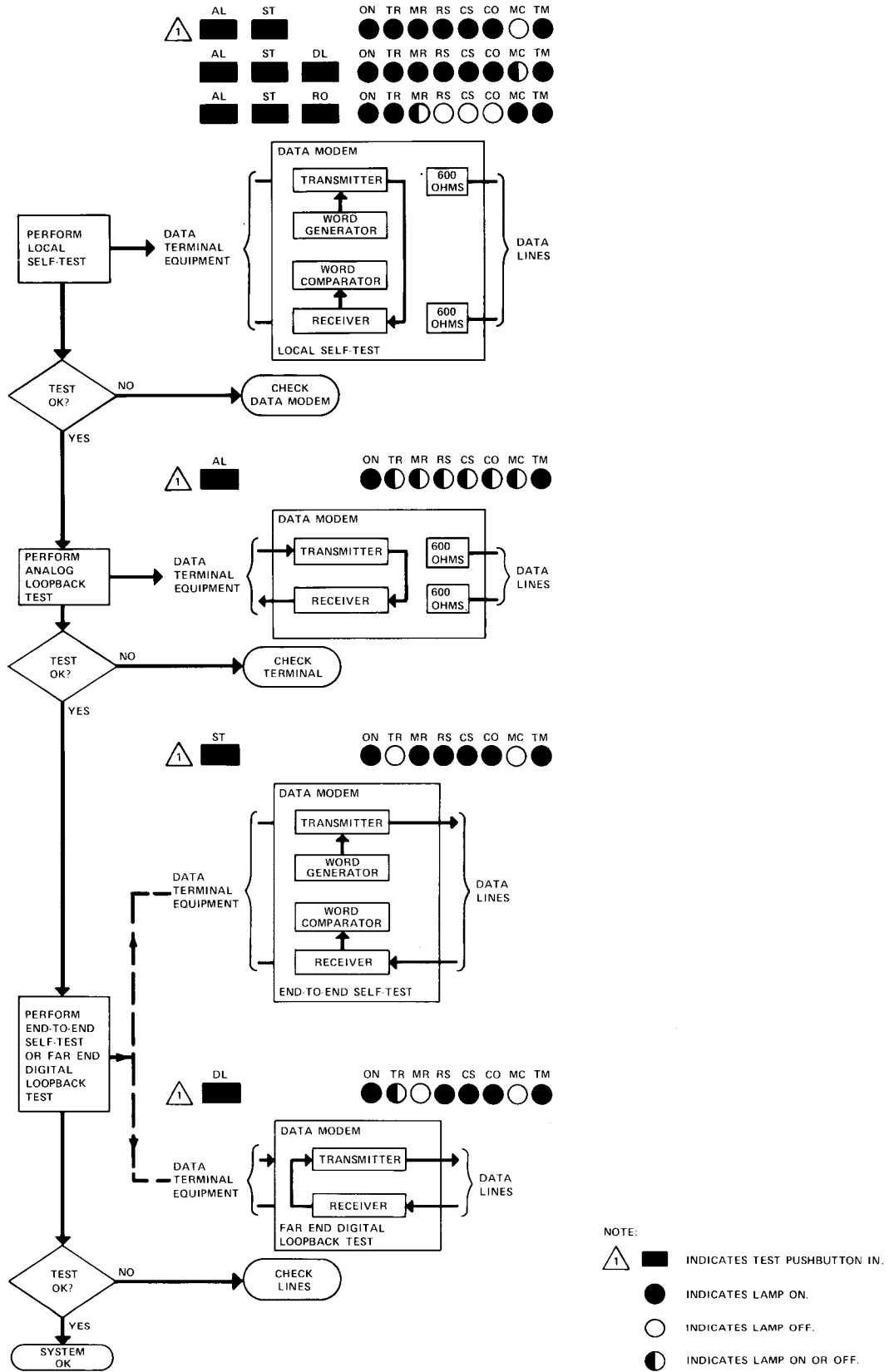
**2.02** To perform the local self-test:

- (a) Ensure that data modem is not transmitting or receiving data.
- (b) Press data modem AL and ST pushbuttons. All data modem lamps should light except MC lamp. If lamp indications are not as specified, data modem has failed test.
- (c) Observe MC lamp for 30 seconds. MC lamp should not flash or light. If MC lamp flashes or lights, data modem has failed local self-test.
- (d) Press data modem RO pushbutton. RS and CS lamps go out and MC lamp lights. If lamp indication are not as specified, data modem has failed test.
- (e) Press (release) RO pushbutton. RS and CS lamps light and MC lamp goes out.



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Fig. 3-2. Two-Wire System Checkout



80086-1

Fig. 3-3. Four-Wire System Checkout

(f) Press data modem DL pushbutton. All data modem lamps should light except MC. MC lamp should alternately flash off and on. If lamp indications are not as specified, data modem has failed local self-test.

(g) Observe MC lamp for 30 seconds. MC lamp should not stay on continuously or remain off. If MC lamp stays on continuously or remains off, data modem has failed test.

(h) Press (release) DL, AL, and ST pushbuttons. Station is restored to idle mode.

### 3. ANALOG LOOPBACK TEST (TWO- OR FOUR-WIRE)

3.01 Refer to Figs. 3-2 and 3-3 for a block diagram of the data modem during the analog loopback test. Certain terminals require Data Set Ready (CC) lead on during the analog loopback test. This may be accomplished by means of a data modem option. During the test the terminal loops a signal through the data modem transmitter, attenuator, receiver, and back to the terminal. The analog loopback test checks the data modem, data terminal, and interconnecting cables.

3.02 To perform the analog loopback test:

(a) Press AL pushbutton. TM lamp lights and MR lamp goes out. Refer to Table 3-A for other lamp indications.

(b) Refer to data terminal procedures and apply recommended test inputs to data modem. Verify that data terminal receives proper outputs from data modem.

(c) Press (release) AL pushbutton to end test. TM lamp goes out.

(d) Station is restored to idle mode.

### 4. END-TO-END SELF-TEST

4.01 Refer to Figs. 3-2 and 3-3 for a block diagram of the data modem during end-to-end self-test. When performing the test another TA201C or T201C compatible data modem can be used at the remote site. This test checks the data modem and lines. The terminal is isolated from the data modem by pressing ST pushbutton. The line configuration may be either two- or four-wire however; in the two-wire configuration the receiving data modem requires RO pushbutton pressed.

#### A. Two-Wire End-To-End Self-Test

4.02 To perform the end-to-end two-wire self-test:

(a) Press ST switches at both ends. (At receiving end, RO switch must also be pressed).

(b) Verify that line connection is made between local data modem and far-end data modem.

(c) At both ends enter data mode.

(d) At transmit end, check that CO lamp is not lighted and all other lamps are lighted. At receiving end, check that RS, CS, and MC lamps are not lighted and all other lamps are lighted. At receiving end, MC lamp blinks when error is detected. If MC lamp blinks (when averaged over total test period) more than twice per minute or remains on continuously, data modem or telephone facility is at fault.

(e) Repeat test in opposite direction by releasing RO switch at one end and pressing RO switch at other end.

(f) Return data modem to normal operation by pressing ST switches at both ends and RO switch at receiving end. Switches return to out position and TM lamp goes out. MC lamp lights if data modem is not receiving line signal (CO lamp not lighted). If DTR from terminal is high, system is ready.

**B. Four-Wire End-To-End Self-Test**

**4.03** To perform the end-to-end four-wire self-test:

- (a) Press ST switch at local data modem and observe that TM lamp lights.
- (b) Call far-end station and request ST switch be pressed. Verify that switch remains in and TM lamp lights.
- (c) Verify line connection is made between local data modem and far-end data modem. After verification, observe that MC lamp is not lighted, and all other lamps are lighted. Lamps should be checked at both ends. MC lamp indicates errors as they occur. If MC lamp blinks an average of more than twice per minute or remains on continuously, data modem or telephone facility is at fault.
- (d) Return data modem to normal operation by pressing ST switches at both ends. ST switches return to out position and TM lamp goes out. MC lamp lights if data modem is not receiving a line signal (CO lamp not lighted).

**5. DIGITAL LOOPBACK TEST (FOUR-WIRE)**

**5.01** Refer to Fig. 3-3 for a block diagram of the data modem during digital loopback test. When performing the test another TA201C or T201C compatible data modem can be used, however, remote data modem must have been tested previously. Otherwise, any possible trouble indications may be caused by either data modem. This test checks the data modem and lines.

**5.02** To perform the digital loopback test:

- (a) Press ST switch at local end and check that TM lamp lights.

- (b) Have DL switch at far-end data modem pressed and verify that DL switch remains in and TM lamp lights.

- (c) Verify line connection is made between local data modem and far-end data modem.

- (d) At local end, check that MC lamp is not lighted and all other lamps are lighted. If error occurs in either transmit or receive path, MC lamp blinks on and off alternately. An average error rate of two blinks per minute or less indicates satisfactory operation.

- (e) Return data modem to normal operation by pressing DL switch at far end and ST switch at local end. MC lamp lights if data modem is not receiving data (CO lamp not lighted).

**6. REFERENCES**

**6.01** The following publications provide additional information for standalone and multiple installations using TA201C Data Modem.

SECTION	TITLE
5214-100	TA201C Data Modem Description and Operation
5214-200	TA201C Data Modem Installation and Connection
5214-500	TA201C Data Modem Tests Using External Test Equipment
5225	TA201C Users Manual
5219	TA201C Maintenance Manual